REMARKS

Entry of the foregoing Response is requested on the grounds that the claims patentably distinguish over the cited art of record or, alternatively, place the application in better condition for appeal. The claims particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The claims are believed to avoid the rejections applied in the Final Office Action for reasons set forth more fully below.

The Final Office Action of July 8, 2008 has been received and carefully reviewed. It is submitted that, by this Response, all bases of rejection are traversed and overcome. Upon entry of this Response, claims 24-33, 35-41, 49, and 50 remain in the application. Reconsideration of the claims is respectfully requested.

Claim 49 stands rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Okada et al. (U.S. Patent No. 4,943,496). The Examiner asserts that Okada teaches all elements of claim 49. The Examiner further asserts that the pores of the porous plate (i.e., the anode electrode) are construed as cracks in the electrode that inherently enhance the surface area of the electrode for one or more catalytic reactions in the fuel cell. The Examiner reasons that, on a microscopic level, a pore is equivalent to a crack.

In response thereto, Applicant respectfully disagrees with the Examiner's assertions stated above. Applicants' claim 49 is directed to a fuel cell including at least one electrode, wherein "the electrode includes ***a film*** consisting essentially of a metal oxide established on a substrate, ***the film*** having at least one crack formed therein during a process for forming the film…" (emphasis added).

Okada discloses a fuel cell having an electrode including a porous electron-conducting body (also referred to as a porous plate) containing ceramic particles dispersed therein and a superficial thin portion free of ceramic particles at the fuel or oxidizing gas-passing side of the body (see column 3, lines 4-10). Unlike the fuel cell defined in Applicants' claim 49, Okada does ***not*** disclose that ***a film*** consisting essentially of a metal oxide is established on the porous electron-conducting body.

Further, Okada discloses that electrodes of the prior art that use oxide-mixed metal powders (i.e., have different layers such as a metal layer and an oxide layer) ***inconveniently*** have cracks generated during the process of preparing the electrode (see column 1, lines 60-65). It was therefore an object of the Okada invention to provide an electrode with improvements with respect to reducing contact resistance between the electrode and an electrolyte plate – i.e., having ***no cracks***, warp and wave generated therein (see column 2, lines 28-32). For example, the metal powder selected for the porous plate includes a metal having a particle size ranging from 1 to 10 μm. If particle sizes of the metal are smaller than 1 μm, sintering action is accelerated in the firing step of the process of forming the electrode, reducing the specific surface area of the electrode, thereby causing cracks in the electrode (see column 3, lines 27-46). Thus, Okada actually ***teaches away*** from the porous plate having one or more cracks therein.

Additionally, Applicants respectfully disagree with the Examiner's reasoning that the pores in the porous plate are the same as cracks that inherently enhance the surface area of the electrode for catalytic reactions in the fuel cell. A "crack" is generally known as "a blemish resulting from a break without complete separation of the parts" (see http://wordnet.princeton.edu/perl/webwn?s=crack). A "pore," on the other hand, is "a small interstice… admitting absorption or passage of liquid" (see http://www.merriam-webster.com/dictionary/pore). As known by a skilled artisan, pores are specifically constructed in an article so that a particular fluid may pass through the article. For example, in Okada, the pore size is constructed to be between 3 and 10 μm in order to avoid problems including, e.g., a reduction in electrode reaction areas, poor cell performance, a weakening in the strength of electrode plate, and a lowered creep resistance. (See column 3, line 62 through column 4, line 3 of Okada.) A pore, as described by Okada and as defined above, is ***not*** a blemish resulting from a break (i.e., a crack).

Yet further, in light of Okada's teaching away from the porous plate including cracks, Applicants submit that Okada is also clearly differentiating between a pore and a crack. Thus, one skilled in the art would not equate a pore with a crack based on these teachings in Okada.

For all the reasons stated above, it is submitted that Applicants' invention as defined in independent claim 49 is not anticipated, taught or rendered obvious by Okada, either alone or in combination, and patentably defines over the art of record.

Claims 24-29, 32, 33, 35-41, and 49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hara et al. (U.S. Patent Publication No. 2003/0012995) in view of Hata et al. (U.S. Patent No. 6,902,790). The Examiner asserts that the combination of Hara and Hata renders obvious independent claims 24 and 49.

In response thereto, Applicants disagree with the Examiner's rejection. Hara discloses a planar solid oxide fuel cell stack including first and second cell plates that are alternately stacked on one another. Each cell plate includes an air electrode layer 2, a substrate 4, a solid electrolyte layer 3, and a fuel electrode layer 1 stacked upwards in this order (see paragraph [0038] and Fig. 4 of Hara).

In the instant Final Office Action, the Examiner asserts that the air electrode layer is porous (citing paragraph [0007] of Hara) and that a pore is construed as a microscopic crack. Applicants submit, however, that the air electrode layer that the Examiner is referring to is one that is known in the prior art. Hara does ***not*** disclose or even suggest that the ***same*** air electrode layer is used in any of the inventive embodiments of Hara. Thus, Hara does ***not*** disclose or suggest that the air electrode layer 2 (as shown, for example, in Fig. 4 of Hara) is porous.

Assuming *arguendo* that the air electrode layer 2 is construed to be porous in the embodiments of Hara, Applicants further submit that pores are ***not*** the same as cracks (as asserted by the Examiner). More specifically, as reiterated from above, a pore is ***not*** a blemish in the air electrode layer resulting from a break. In fact, one of the objects of Hara's invention is to avoid cracks that may form between cell plates in the fuel cell stack due to thermal stresses on the junction between the plates. Although

these cracks may not necessarily be formed in the air electrode layer (though it is possible), Hara is clearly disclosing that the cracks are in fact blemishes caused from thermal stresses on the junction area.

For the reasons stated above, Applicants submit that Hara ***fails*** to teach "a metal oxide film established on the substrate…, ***the metal oxide film having at least one crack formed therein*** during a process of forming the metal oxide film…" (emphasis added), as recited in claims 24 and 49. Applicants further submit that Hata ***fails*** to supply this deficiency of Hara. To reiterate from Applicants' Amendment dated March 17, 2008, Hata discloses a planar solid oxide fuel cell including a ceramic sheet that may effectively be applied as a thin, solid electrode or electrolyte film. An object of the Hata reference is "to provide a ceramic sheet as in a constitutive material for use in a planar SOFC and the like which exhibits ***less cracking or breakage*** even when a large stacking-induced load or thermal stress is applied, and a process for producing the ceramic sheet" (emphasis added). (See column 4, lines 7-11 of Hata.) Since Hata teaches that the ceramic sheet is designed and produced to avoid cracks, it is submitted that Hata ***teaches away*** from enhancing the surface area of the ceramic sheet for one or more catalytic reactions by forming one or more cracks in the sheet.

For all of the foregoing reasons, it is submitted that Applicants' invention as defined in independent claims 24 and 49 is not anticipated, taught, or rendered obvious by Hara and Hata, either alone or in combination, and patentably defines over the art of record.

Claims 30 and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hara and Hata, and further in view Wallin et al. (U.S. Patent Publication No. 2002/0187389). For all of the reasons stated above, it is submitted that the combination of Hara and Hata fails to render obvious independent claim 24, from which claims 30 and 31 depend. It is further submitted that the combination of Hara, Hata, and Wallin fails to render obvious claims 30 and 31 because of their dependency on claim 24. As such, it is submitted that Applicants' invention as defined in claims 30 and 31 is not

anticipated, taught, or rendered obvious by Hara, Hata, and Wallin, either alone or in combination, and patentably defines over the art of record.

Claim 50 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hara and Hata, and further in view of Kearl et al. (U.S. Patent Publication No. 2002/0155335). The Examiner asserts that the combination of Hara, Hata, and Kearl renders obvious independent claim 50.

Independent claim 50 is also directed to a fuel cell. Claim 50 recites, in part, "wherein the electrode includes a film consisting essentially of a metal oxide established on a substrate, ***the film having at least one crack formed therein*** during a process for forming the film…" (Emphasis added.)

Applicants herein reiterate all of the arguments set forth above with respect to independent claims 24 and 49. Applicants further submit that Kearl ***fails*** to supply the deficiencies of Hara and Hata. To reiterate from Applicants' Amendment dated March 17, 2008, Kearl teaches a solid oxide fuel cell including a think film electrolyte layer, a thick film anode layer disposed on one side of the electrolyte layer, and a thick film cathode layer disposed on the other side of the electrolyte layer. The solid oxide fuel cell is designed to have a higher performance/higher power density at substantially lower operating temperatures than other solid oxide fuel cell designs. Applicants submit, however, that Kearl does ***not*** teach or suggest cracks in the electrode for providing increased surface area for one or more catalytic reactions in the fuel cell.

As such, Applicants submit that the combination of Hara, Hata, and Kearl ***fails*** to teach all elements of independent claim 50. Accordingly, it is submitted that Applicants' invention as defined in claim 50 is not anticipated, taught, or rendered obvious by Hara, Hata, and Kearl, either alone or in combination, and patentably defines over the art of record.

In summary, claims 24-33, 35-41, 49, and 50 remain in the application. It is submitted that, through this Amendment, Applicants' invention as set forth in these claims is now in a condition suitable for allowance. Should the Examiner believe

otherwise, it is submitted that the claims as amended qualify for entry as placing the application in better form for appeal.

Further and favorable consideration is requested. If the Examiner believes it would expedite prosecution of the above-identified application, the Examiner is cordially invited to contact Applicants' Attorney at the below-listed telephone number.

Respectfully submitted,

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